Lab-Aids Correlations for

MICHIGAN K-12 STANDARDS: SCIENCE

MIDDLE SCHOOL – GRADES 6-8

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This document is intended to show how the SEPUP *Issues and Science: 3rd edition Redesigned for the NGSS* materials align with the Michigan K-12 Standards: Science, November 2015.

ABOUT OUR PROGRAMS

Lab-Aids has based its home offices and operations in Ronkonkoma, NY, since 1963. We publish over 200 kits and core curriculum programs to support science teaching and learning, grades 6-12. All core curricula support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and are able to do as a result of program use. All programs have extensive support for technology and feature comprehensive teacher support. For more information please visit www.lab-aids.com and navigate to the program of interest.

SEPUP

Materials from the Science Education for Public Understanding Program (SEPUP) are developed at the Lawrence Hall of Science, at the University of California, Berkeley, and distributed nationally by Lab-Aids, Inc. Since 1987, development of SEPUP materials has been supported by grants from the National Science Foundation and other public and private sources. SEPUP programs include student books, equipment kits, teacher materials, and online digital content, and are available as full year courses, or separately, as units, each taking 3-8 weeks to complete, as listed below.

SCOPE AND SEQUENCE

SEPUP *Issues and Science* curriculum units are designed for flexible use in science classrooms to accommodate different plans across states and school districts. Teachers can use units to customize a sequence that fits their standards. SEPUP offers recommendations for both discipline-specific and integrated sequences.

Middle School, Grades 6-8

Discipline-specific suggested scope and sequence

Grade 6	**Grade 7**	**Grade 8**
Land, Water, and Human Interactions	Ecology	Energy
Geological Processes	Body Systems	Chemistry of Materials
Earth's Resources	From Cells to Organisms	Chemical Reactions
Weather and Climate	Reproduction	Force and Motion
Solar System and Beyond	Evolution	Fields and Interactions
	Biomedical Engineering	Waves

Three-year integrated suggested scope and sequence

Grade 6	**Grade 7**	**Grade 8**
Land, Water, and Human Interactions	Ecology	Evolution
Energy	Geological Processes	Earth's Resources
Weather and Climate	Chemistry of Materials	Solar System and Beyond
Body Systems	Chemical Reactions	Force and Motion
From Cells to Organisms	Reproduction	Fields and Interactions
	Biomedical Engineering	Waves

ABOUT THE LAB-AIDS CITATIONS

Citations included in the correlation document are as follows:

SEPUP Unit title: *The Chemistry of Materials:*
Activity Number 2, 12, 14*

* indicates where Performance Expectation is assessed

** - Integrates traditional science content with engineering.
MI - Includes a Michigan specific performance expectation.
MI*- Allow for local, regional, or Michigan specific contexts or examples in teaching and assessment.

Middle School (Grades 6-8)

Performance Expectation	SEPUP Unit and Activity Number
Structure and Properties of Matter	
MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.	*Chemistry of Materials:* 2, 6, 7, 12*
MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	*Chemistry of Materials:* 1, 2, 3, 4, 5, 11, 12, 13*
MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	*Chemistry of Materials:* 8, 9, 10*
Chemical Reactions	
MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	*Chemical Reactions:* 1, 2, 3, 4, 5* *Chemistry of Materials:* 4
MS-PS1-5: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	*Chemical Reactions:* 1, 2, 3, 4, 5, 6, 7*
MS-PS1-6: Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.**	*Chemical Reactions:* 2, 3, 5, 8, 9, 10, 11*
Forces and Interactions	
MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.**	*Force and Motion:* 1, 10, 11, 12*
MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	*Force and Motion:* 1, 6, 7, 8, 9, 13*
MS-PS2-3: Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	*Fields and Interactions:* 7, 8, 9, 12, 13*, 14
MS-PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	*Fields and Interactions:* 3, 4, 7*
MS-PS2-5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	*Fields and Interactions:* 5, 7, 9, 10, 12*
Energy	
MS-PS3-1: Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	*Force and Motion:* *1, 2, 3, 4, 5**

Performance Expectation	SEPUP Unit and Activity Number
MS-PS3-2: Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	*Fields and Interactions:* 3, 4, 6, 7, 10, 11* *Force and Motion:* 1, 3, 4, 5, 10, 14
MS-PS3-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. **	*Energy:* 1, 7, 8, 10, 11, 12, 13*
MS-PS3-4: Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.	*Energy:* 1, 4, 6, 7, 8*
MS-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	*Energy:* 2, 3, 4, 5, 6*
Waves and Electromagnetic Radiation	
MS-PS4-1: Use Mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	*Waves:* 1, 2, 3, 7*
MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	*Waves:* 3, 4, 8, 9, 10, 11, 12, 13*
MS-PS4-3: Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	*Waves:* 5, 6
Structure, Function, and Information Processing	
MS-LS1-1: Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.	*From Cells to Organisms:* 1, 2, 3, 4, 9*
MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.	*From Cells to Organisms:* 6, 7, 8*
MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	*From Cells to Organisms*: 10, 14, 15 *Body Systems:* 1, 2, 3, 4, 9, 10, 11, 12*
MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	*Body Systems:* 6, 7, 8*
Matter and Energy in Organisms and Ecosystems	
MS-LS1-6: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	*From Cells to Organisms*: 12, 13*

Performance Expectation	SEPUP Unit and Activity Number
MS-LS1-7: Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	*From Cells to Organisms*: *5*, 11* *Body Systems:* 5
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. ***MI****	*Ecology:* 5, 6, 9*
MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. ***MI****	*Ecology:* 7, 8, 11, 12* *From Cells to Organisms:* 13
MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	*Ecology:* 1, 2, 3, 4, 5, 6, 13, 14*
Interdependent Relationships in Ecosystems	
MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. ***MI****	*Ecology:* 2, 8, 10*
MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services. ** ***MI****	*Ecology:* 2, 4, 15*
Growth, Development, and Reproduction of Organisms	
MS-LS1-4: Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	*Reproduction:* 10*, 11*
MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. ***MI****	*Reproduction:* 1, 7*
MS-LS3-1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	*Reproduction:* 1, 3, 8, 12, 13* *Evolution:* 3, 4, 5*
MS-LS3-2 Develop and use models to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.	*Reproduction:* 1, 2, 3, 4, 5, 6, 8, 9*
MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	*Evolution:* 14, 15, 16*

Performance Expectation	SEPUP Unit and Activity Number
Natural Selection and Adaptations	
MS-LS4-1: Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. ***MI****	*Evolution:* *7, 8, 9, 10 11**
MS-LS4-2: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	*Evolution:* 7, 8, 9, 10 11, 12*
MS-LS4-3: Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.	*Evolution:* 12, 13*
MS-LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	*Evolution:* 1, 2, 3, 4*
MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	*Evolution:* 1, 2, 3, 4, 5, 6*
Space Systems	
MS-ESS1-1: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	*Solar System and Beyond:* 2, 3, 4, 5*, 6, 7, 8, 9*
MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	*Solar System and Beyond:* 10, 11, 12, 14, 15, 16*
MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system.	*Solar System and Beyond:* 1, 10, 11, 12, 13*
History of Earth	
MS-ESS1-4: Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6- billion-year-old history.	*Earth's Resources:* 9, 10, 11, 12*
MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	*Geological Processes:* 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13* *Land, Water, and Human Interactions:* *3,* 4, 6, 7, 8, 10, 11, 12, 13, 14*
MS-ESS2-3: Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	*Geological Processes:* 10, 11, 12, 13, 14*

Performance Expectation	SEPUP Unit and Activity Number
Earth's Systems	
MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. ***MI****	*Geological Processes:* 2, 5, 8, 9, 10, 11, 13, 14, 15*
MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. ***MI****	*Land, Water, and Human Interactions:* 2, 5, 7, 8, 9*
MS-ESS3-1: Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. ***MI****	*Geological Processes:* 2, 16*, 17* *Earth's Resources:* 1, 2, 3, 5, 7, 8, 14*
Weather and Climate	
MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions. ***MI*** MS-ESS2-5 MI: *Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions in Michigan due to the Great Lakes and regional geography.*	*Weather and Climate:* 2, 3, 7, 9, 10, 11, 12, 13*
MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	*Weather and Climate:* 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14*
MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	*Weather and Climate:* 1, 10, 14, 15, 16*
Human Impacts	
MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	*Geological Processes:* 1, 3, 4, 6, 7, 8, 11, 18*
MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. ** ***MI****	*Land, Water, and Human Interactions:* 1, 3, 4, 5, 6, 9, 13, 14, 15, 16*
MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	*Earth's Resources:* 2, 4, 6, 13* *Evolution:* 14

Performance Expectation	SEPUP Unit and Activity Number
Engineering Design	
MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	*Biomedical Engineering:* 1, 2, 3*
	Force and Motion: 1, 10, 11, 13, 14, 15*
	Fields and Interactions: *2, 3, 6**
	Land, Water, and Human Interactions: 7, 12*
MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	*Biomedical Engineering:* 4, 5, 7*
	Fields and Interactions: *6, 13, 15*
	Land, Water, and Human Interactions: *12, 16**
MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	*Biomedical Engineering:* *1, 2, 4, 5**
	Chemical Reactions: *8, 9, 10, 11*
	Weather and Climate: *12**
	Fields and Interactions: *6, 11, 13, 15**
MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	*Biomedical Engineering:* 2, 4, 5, 8, 9*
	Chemical Reactions: 8, 9, 10, 11
	Weather and Climate: 12*
	Fields and Interactions: 1, 2, 3, 6, 11, 13*